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EXAMINER	
TURNER, SAMUEL A	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 01/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

SP

Office Action Summary	Application No.	Applicant(s)	
	10/712,702	WILLIG ET AL.	
	Examiner	Art Unit	
	Samuel A. Turner	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-84* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-84* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 August 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-9, 20, 25, 26, 31, 32, 42-49, 51-58, 60, 66, 67, 70, 74, and76-84 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Digonnet(2004/0061863).

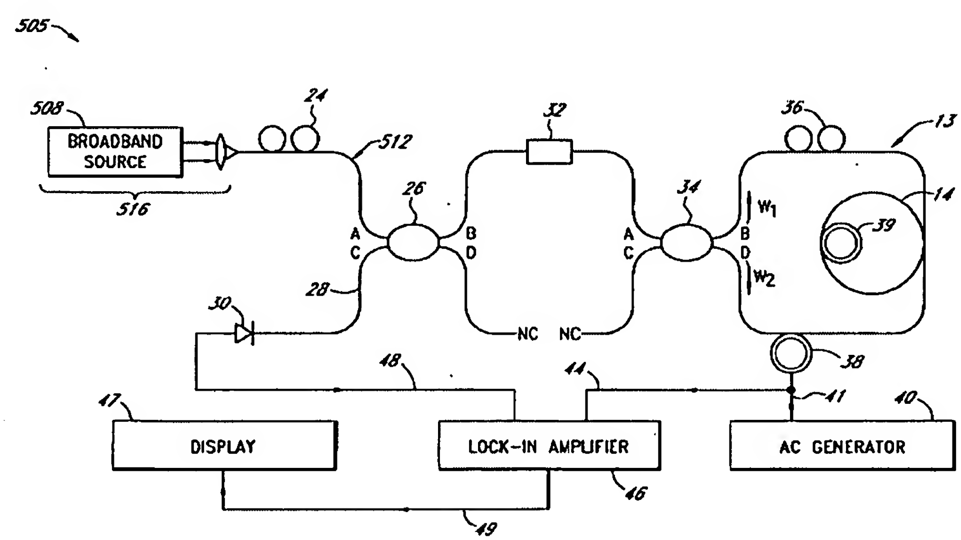


FIG. 5

Digonnet teaches a photonic crystal interferometric optical gyroscope system (**figure 5**) comprising:

a light source for providing a primary beam of light(**508, paragraph[0069]**);

a photonic crystal sensing coil having a rotational axis(**14, paragraphs[0041],[0045]**); and

a beam controlling device configured to split said primary beam into first and second counter-propagating beams in said photonic crystal sensing coil and configured to direct return of said counter-propagating beams wherein the power of said returning counter-propagating beams represents the phase shift between said counter-propagating beams and is indicative of the rate of rotation of said coil about said rotational axis(**505, paragraph[0068]**).

As to claim 2, said photonic crystal sensing coil is formed by winding a photonic crystal fiber having a gas-solid structure that confines said light by total internal reflection(**14, paragraphs[0041],[0045]**).

As to claim 3, said photonic crystal sensing coil is formed by winding a band gap fiber which confines said light by employing an optical band gap(**14, paragraphs[0041],[0045]**).

As to claim 4, said photonic crystal fiber is configured to maintain the polarization of said first and second counter-propagating beams(**14, paragraph[0037]**).

As to claim 5, said photonic crystal fiber is configured to propagate only one state of polarization of said first and second counter-propagating beams(**14, paragraph[0044]**).

As to claim 6, said photonic crystal fiber is configured to propagate a single mode of light(**14, paragraph[0044]**).

As to claim 7, said band gap fiber is configured to maintain the polarization of said light(**14, paragraph[0037]**).

As to claim 8, said band gap fiber is configured to propagate only one state of polarization of said light(**14, paragraph[0044]**).

As to claim 9, said band gap fiber is configured to propagate a single mode of light(**14, paragraph[0044]**).

As to claim 20, said band gap fiber includes a hollow core region surrounded by a solid clad including a plurality of hollow channels configured to define a band gap which confines the majority of light in said hollow core region and propagates a single mode of light(**14, paragraphs[0041],[0045]**).

As to claim 25, said clad is made of silica, and/or plastic, and/or a dielectric material(**14, paragraphs[0041],[0045]**).

As to claim 26, said band gap fiber includes a hollow core region surrounded by solid clad having a plurality of alternating layers of solid dielectric material, said alternating layers of dielectric material configured to create a band gap effect

that confines the majority of light in said hollow core region and propagates a single mode of light(**14, paragraphs**[0041],[0045]).

As to claim 31, said alternating layers of solid dielectric material includes silica and/or plastic(**14, paragraphs**[0041],[0045]).

As to claim 32, said alternating layers of solid dielectric material includes a material chosen from the group consisting of: silica, doped silica, fluoride glasses, chalcogenide glasses and thermoplastic polymers(**14, paragraphs**[0041],[0045]).

As to claim 42, further including an optical wave guide configured to interconnect said light source and said beam controlling device and/or said beam controlling device and photonic crystal sensing coil(505, **paragraph**[0068],[0078]).

As to claim 43 said optical wave guide is chosen from the group consisting of: a solid structure wave guide that confines said light by total internal reflection, a photonic crystal wave guide having a gas-solid structure that confines said light by total internal reflection, and a band gap wave guide that confines said light by employing an optical band gap(505, **paragraph**[0068],[0078]).

As to claim 44, wherein said solid structure wave guide is configured as an optical fiber, said photonic crystal wave guide is configured as photonic crystal fiber, and said band gap wave guide is configured as a band gap optical fiber(505, **paragraph**[0068],[0078]).

As to claim 45 said optical fiber, said photonic crystal fiber, and said band gap fiber are configured to maintain the polarization of said light(14, paragraph[0037]).

As to claim 46, said optical fiber, said photonic crystal fiber, and said band gap fiber are configured to propagate only one state of polarization of said light(14, paragraph[0044]).

As to claim 47, said optical fiber, said photonic crystal fiber, and said band gap fiber are configured to propagate a single mode of light(14, paragraph[0044]).

As to claim 48, said beam controlling device includes first and second optical splitters and a least one phase modulator(26,34,38).

As to claim 49, said first optical splitter is a reciprocal splitter(26).

As to claim 51, said first optical splitter is configured to direct light from said light source to a coil splitter and direct the return of said first and second counter-propagating beams from said sensing coil to a light detector(26).

As to claim 52, said first optical splitter is configured as a broad-band splitter to transmit light with a spectral width up to about 1500 nm(508, paragraph[0026]).

As to claim 53, said second optical splitter is a reciprocal splitter(36).

As to claim 54, said second optical splitter is configured to divide said light from said light source into two equal said first and second counter-propagating beams(26, paragraph[0032]).

As to claim 55, said at least one phase modulator is configured to add a time dependent phase shift to said first and second counter-propagating beams to produce a phase shift between said first and second counter-propagating beams such that said first and second counter-propagating beams constructively interfere to modify said power thereby improving the precision of said system(38).

As to claim 56, further including a photo detector configured to convert said power to an electrical signal(30).

As to claim 57, said photo detector is chosen from the group consisting of: a PIN photo detector, an avalanche photo detector, a photo multiplier tube, a bolometer, a photo resistive detector, and a photo conductive detector(30, paragraph[0029]).

As to claim 58, said light source provides said primary beam of light having a wavelength in the range of about 100 nm to 15,000 nm(508, paragraph[0026]).

As to claim 60, said light source is chosen from the group consisting of: an amplified spontaneous emission light source, a stimulated emission light source, a thermally excited light source, a fluorescent light source, an electro-luminescence light source, a chemical luminescence light source, and a phosphorescence light source(508, paragraph[0069]).

As to claim 66, said stimulated emission light source includes a laser(508, paragraph[0060]).

As to claim 67, said stimulated emission light source is chosen from the group consisting of: a helium-neon doped fiber with a cavity, an argon doped fiber with a cavity, a carbon dioxide doped fiber with a cavity, and a semiconductor material with a cavity(508, **paragraph[0069]**).

As to claim 70, said light source is a broad-band light source which emits light with a spectral width up to about 1500 mn(508, **paragraph[0026]**).

With regard to claim 74, Digonnet teaches a photonic crystal interferometric optical gyroscope system comprising:

a broad-band light source for providing a primary beam of light with increased spectral width(508, **paragraph[0069]**);

a photonic crystal sensing coil having a rotational axis(**14, paragraphs[0041],[0045]**); and

a beam controlling device configured to split said primary beam into first and second counter-propagating beams in said photonic crystal sensing coil and configured to direct return of said counter-propagating beams; wherein the power of said returning counter-propagating beams represents the phase shift between said counter-propagating beams and is indicative of the rate of rotation of said coil about said rotational axis(505, **paragraphs[0068]**).

As to claim 76, said primary beam of light has a spectral width up to about 1500 nm(508, **paragraphs[0026]**).

As to claim 77, said photonic crystal sensing coil is formed by winding a photonic crystal fiber having a gas-solid structure that confines said light by total internal reflection(**14, paragraphs[0041],[0045]**).

As to claim 78, said photonic crystal sensing coil is formed by winding a band gap fiber which confines said light by employing an optical band gap(**14, paragraphs[0041],[0045]**).

As to claim 79, said photonic crystal fiber is configured to maintain the polarization of said first and second counter-propagating beams(**14, paragraphs[0037]**).

As to claim 80, said photonic crystal fiber is configured to propagate only one state of polarization of said first and second counter-propagating beams(**14, paragraphs[0044]**).

As to claim 81, said photonic crystal fiber is configured to propagate a single mode of light(**14, paragraphs[0044]**).

As to claim 82, said band gap fiber is configured to maintain the polarization of said light(**14, paragraphs[0037]**).

As to claim 83, said band gap fiber is configured to propagate one state of polarization of said light(**14, paragraphs[0044]**).

As to claim 84, said band gap fiber is configured to propagate a single mode of light(**14, paragraphs[0044]**).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10-19, 21-24, 27-30, 33-41, 50, 59-66, 68, 69, 71-73, and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Digonnet(2004/0061863).

With regard to claims 10-13, Digonnet fails to teach a coil with the number of turns claimed. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide any number of turns in the coil, see paragraph [0026] of Digonnet.

With regard to claims 59 and 71, Digonnet fails to teach a source with a wavelength of 1200 nm. It would have been obvious to one of ordinary skill in the

art at the time the invention was made to use a source wavelength which minimizes the loses caused by the optical fiber, **see paragraph [0026] of Digonnet**.

With regard to claims 61-66, 68, 69, and 75; Digonnet fails to teach the specific light sources claimed, however it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Digonnet apparatus by using any source having the desired wavelength and bandwidth, see **paragraph [0026], [0061], and [0069] of Digonnet**.

With regard to claims 72 and 73, Digonnet fails to teach the specific ARW values claimed, however it would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the gyro to produce the lowest angle of random walk possible, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With regard to claims 14-19, 21-24, 27-30, 33-41, and 50; Digonnet fails to teach a solid core photonic crystal fiber with a jacket and the diameters claimed, hollow core photonic crystal fiber with a jacket and the diameters claimed, asymmetric hollow and solid cores, specific coil dimensions, and non-reciprocal splitters. Official notice is taken that solid core photonic crystal fiber having a jacket and a diameter in the range of 10µm to about 35µm and can be larger are well known in the art. Further, the core arrangement can be geometrically uniform,

random, asymmetric, or periodic. Non-reciprocal splitters, such as circulators are also well known in the art. See In re Malcom, 1942 C.D 589; 543 O.G. 440.

> If applicant does not traverse the examiner's assertion of official notice or applicant's traverse is not adequate, the next Office action will indicate that the common knowledge or well-known in the art statement is taken to be admitted prior art because applicant either failed to traverse the examiner's assertion of official notice or that the traverse was inadequate.

With regard to claims 14-19, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Digonnet apparatus by replacing the hollow core photonic crystal with a known solid core equivalent. The diameter range is known and chosen based on wavelength, bandwidth, polarization state, and the number of modes desired.

With regard to claims 21-24, and 27-30; it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the hollow core photonic crystal fiber to have any diameter range chosen based on wavelength, bandwidth, polarization state, and the number of modes desired.

With regard to claims 33-38, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use known equivalent asymmetric hollow or solid core photonic crystal fibers in place of the photonic crystal fibers of Digonnet.

With regard to claims 39-41, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a coil of any desired size since such a modification would have involved a mere change in the size of a

component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

With regard to claim 50, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Digonnet apparatus by replacing coupler 26 with a non-reciprocal coupler, such as a circulator, in order to maximize the light to the coil and to the detector.

Claims 1-3, 6, 9-32, 39-44, 47-77, and 81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergh et al(4,773,759) in view of DiGiovanni et al(5,802,236).

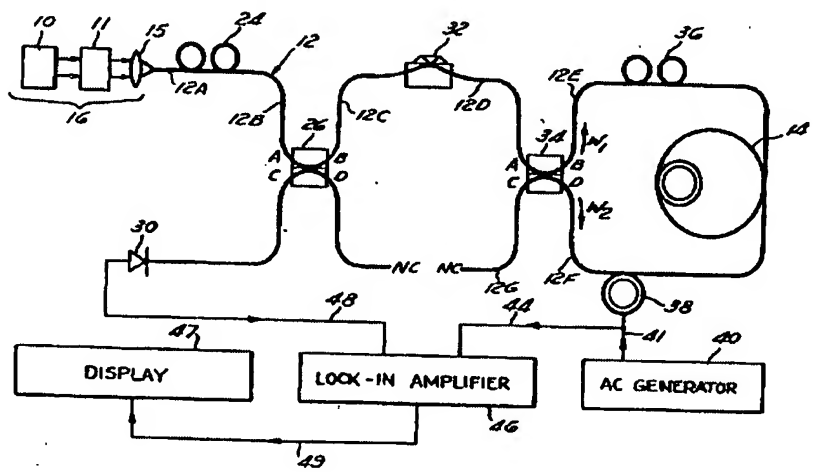
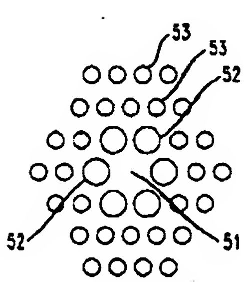
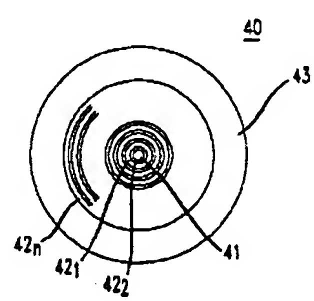


Fig. 1

FIC. 4

FIC. 5





With regard to claim 1, Bergh et al teach an interferometric optical gyroscope system (**figure 1**) comprising: a light source(10; **column 5, lines 14-37**), a sensing coil(14; **column 5, lines 38-45**), and a beam controlling device(26,34; **column 7, lines 40+**).

As to claim 42, including an optical wave guide(12; **column 5, lines 38-40**) configured to interconnect said light source and said beam controlling device and/or said beam controlling device and photonic crystal sensing coil.

As to claim 43, said optical wave guide is chosen from the group consisting of: a solid structure wave guide that confines said light by total internal reflection, a photonic crystal wave guide having a gas-solid structure that confines said light by total internal reflection, and a band gap wave guide that confines said light by employing an optical band gap(12; **column 5, lines 38-40**).

As to claim 44, wherein said solid structure wave guide is configured as an optical fiber, said photonic crystal wave guide is configured as photonic crystal fiber, and said band gap wave guide is configured as a band gap optical fiber(12; **column 5, lines 38-40**).

As to claim 47. The system of claim 44 in which said optical fiber, said photonic crystal fiber, and said band gap fiber are configured to propagate a single mode of light(12; **column 5, lines 38-40**).

As to claim 48, said beam controlling device includes first and second optical splitters(26,34; **column 7, lines 40+**) and a least one phase modulator(38; **column 6, lines 52-59**).

As to claim 49, said first optical splitter is a reciprocal splitter(26; **column 7, lines 40+**).

As to claim 51, said first optical splitter(26; **column 7, lines 40+**) is configured to direct light from said light source to a coil splitter and direct the return of said first and second counter-propagating beams from said sensing coil to a light detector(30; **column 6, lines 15-34**).

As to claim 52, said first optical splitter is configured as a broad-band splitter to transmit light with a spectral width up to about 1500 nm(26; **column 6, lines 15+**).

As to claim 53, said second optical splitter is a reciprocal splitter(34; **column 7, lines 40+**).

As to claim 54, said second optical splitter is configured to divide said light from said light source into two equal said first and second counter-propagating beams(34; **column 7, lines 40+**).

As to claim 55, said at least one phase modulator is configured to add a time dependent phase shift to said first and second counter-propagating beams to produce a phase shift between said first and second counter-propagating beams such that said first and second counter-propagating beams constructively interfere

to modify said power thereby improving the precision of said system(38; **column 6, lines 52-59**).

As to claim 56, including a photo detector configured to convert said power to an electrical signal(30; **column 6, lines 15-34**).

As to claim 57, said photo detector is chosen from the group consisting of: a PIN photo detector, an avalanche photo detector, a photo multiplier tube, a bolometer, a photo resistive detector, and a photo conductive detector(30; **column 6, lines 15-34**).

As to claim 58, said light source provides said primary beam of light having a wavelength in the range of about 100 nm to 15,000 nm(10; **column 5, lines 14-26**).

As to claim 60, said light source is chosen from the group consisting of: an amplified spontaneous emission light source, a stimulated emission light source, a thermally excited light source, a fluorescent light source, an electro-luminescence light source, a chemical luminescence light source, and a phosphorescence light source(10; **column 5, lines 14-37**).

As to claim 66 said stimulated emission light source includes a laser(10; **column 5, lines 14-37**).

As to claim 67 said stimulated emission light source is chosen from the group consisting of: a helium-neon doped fiber with a cavity, an argon doped fiber with a cavity, a carbon dioxide doped fiber with a cavity, and a semiconductor material with a cavity(10; **column 5, lines 14-37**).

As to claim 70, said light source is a broad-band light source which emits light with a spectral width up to about 1500 nm(10; **column 5, lines 14-37**).

With regard to claim 74 Bergh et al teach interferometric optical gyroscope system comprising: a broad-band light source(10; **column 5, lines 14-37**), a sensing coil(14; **column 5, lines 38-45**), and a beam controlling device(26,34; **column 7, lines 40+**).

As to claim 76, said primary beam of light has a spectral width up to about 1500 nm(10; **column 5, lines 14-37**).

Bergh et al fail to teach the use of photonic crystal fiber in the gyro coil with the specific characteristics claimed, the specific coil size and number of windings, a non-reciprocal coupler, specific sources and source wavelengths of 1200nm or 1500nm, and the angle random walk values claimed.

DiGiovanni et al teach a photonic crystal, also known as a photonic bandgap or micro structured, fiber waveguide involving a dielectric structure with a refractive index that varies periodically in space(**column 1, lines 29-33**). The fiber can be "single mode fibers or multimode (typically only a few modes) fibers. The core region typically will be solid material, either homogeneous or a combination of materials (e.g., an inner Si core region and an outer SiO_2 core region), but could comprise a liquid. For instance, the core region could comprise a glass capillary tube, with the liquid drawn into the capillary after fiber drawing"(**column 3, lines 26-34**). Both hollow and solid core photonic crystal fibers(**column 4, line 55- column**

5 line 5; figure 5) and photonic crystal band gap fibers(**column 9, line 60- column 10 line 12; figure 4)** are disclosed. The disclosed diameter is 125μm.

With regard to claims 1-3, 6, 9, 14-16, 19-22, 25-28, 31, 32, 42-44, 47-49, 51-58, 60, 66, 67, 74, 76, 77, and 81; it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the single-mode fiber coil of Bergh with the various photonic crystal fibers of DiGiovanni et al. Motivation for this modification can be found in DiGiovanni et al which teaches that photonic crystal fibers have a better mode propagation length(**column 2, lines 44-45**).

With regard to claims 10-13, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide any number of turns in the coil, see **column 5, lines 38-45 of Bergh**.

With regard to claims 17, 18, 23, 24, 29, and 30; it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the fiber of any diameter dependent on the number of modes the fiber must carry, see **column 3, lines 26-34 of DiGiovanni**.

With regard to claims 39-41, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a coil of any size, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955) see **column 5, lines 38-45 of Bergh**.

With regard to claims 59, 61-65, 68-71, and 75; Bergh et al fail to teach the specific light sources claimed, however it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Bergh apparatus by using any source having the desired wavelength and bandwidth, see **column 5, lines 14-45 of Bergh.**

With regard to claims 72 and 73, it would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the gyro to produce the lowest angle of random walk possible, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Official notice is taken that non-reciprocal splitters, such as circulators are also well known in the art. See In re Malcom, 1942 C.D 589; 543 O.G. 440.

> If applicant does not traverse the examiner's assertion of official notice or applicant's traverse is not adequate, the next Office action will indicate that the common knowledge or well-known in the art statement is taken to be admitted prior art because applicant either failed to traverse the examiner's assertion of official notice or that the traverse was inadequate.

With regard to claim 50, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Bergh et al apparatus by replacing coupler 26 with a non-reciprocal coupler, such as a circulator, in order to maximize the light to the coil and to the detector.

Claims 4, 5, 7, 8, 33-38, 45, 46, 78-80, and 82-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergh et al(4,773,759) in view of DiGiovanni et al(5,802,236) as applied to claims 1-3, 6, 9-32, 39-44, 47-77, and 81 above, and further in view of Allan et al(6,243,522).

Allan et al teaches that an asymmetric patterned core will produce a polarization maintaining fiber(**column 4, lines 30-32**), therefor it would have been obvious to one of ordinary skill in the art at the time the invention was made use an asymmetrical core photonic crystal fiber in the coil to further reduce Kerr effects in the coil see **column 6, lines 35-51 of Bergh**.

Relevant Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Birks et al(6,334,019) having other photonic crystal fiber teachings, and Kim et al(Optics Express, 9/2004) teaching a Sagnac loop photonic crystal fiber interferometer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is 571-272-2432.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached on 571-272-2800 ext. 77.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Samuel A. Turner
Primary Examiner
Art Unit 2877